between Fort Providence
Between mile 148 and mile 208
ie rate of movement of ice-
ced in previous years.

ckenzie waters was studied
Water samples were collected,
om mile 211 to mile 503.
ction and chemical analyses
distance of 300 miles, the
e upon the basis of each of the
transparency, turbidity,

. Mathews (University of
glacial and postglacial history
iver. Postglacial water levels
'The Ramparts'; a study was
imens collected for radio-
an old interglacial (?) course

d between Fort Good Hope and

erature measurements in a
Although ground temperatures
drilling operation, a depth of
licated (work being done in
ries Branch).

half of the 110 ice-wedges
bably in February. Cracking
er-winter expansion-
averages less than 0.1 inch.
ched across ice-wedges, and
nd attached to recorders for
ground deformation.

At Paulatuk measurements were made on wind abraded glacial erratics in a coastal area with strong katabatic winds. Small and large glacial erratics show, statistically, a shorter downwind dimension than a cross-wind dimension. The difference may be attributed to postglacial rock abrasion and/or rotation. The mean slopes of faceted boulders vary, statistically, according to rock type with limestones being the lowest, granites the highest. Four totalizing anemometers have been installed to measure the run-of-the-wind and vertical velocity profile. Equipment has been emplaced to measure winter abrasion by sand and snow.

Following the forest and tundra fire in the Inuvik area in August, 1968, several plots were marked in burnt and unburnt areas in order to record geomorphic and permafrost changes.

35. ESKER GEOLOGY, DISTRICT OF KEEWATIN

Project 660030

B.C. McDonald

The second phase of a continuing program to study the sedimentology and morphology of eskers comprised 6 weeks of field work in the Baker Lake area, District of Keewatin[1]. Three weeks were spent about 100 miles southeast of Baker Lake, in an area southeast of the Keewatin ice divide and below the limit of the Tyrrell Sea, and three weeks were spent about 100 miles northwest of Baker Lake, in an area northwest of the ice divide and largely above the limit of postglacial marine inundation. Daily use was made of a Cessna 180 aircraft on pontoons.

Primary esker morphology has been modified by several geomorphic processes which have been active subsequent to esker formation. These include: (1) beach formation, wave-washing, and the sorting and re-deposition that accompanied subsequent glacial-lake or marine episodes; (2) solifluction; (3) frost-heaving and frost-cracking; (4) slumping; and (5) eolian activity. The influence of these processes greatly hinders surface-sampling for meaningful grain-size-variation studies, and it prevents reliable consideration of minor topographic variations as representing esker phenomena.

The major variations in esker morphology seem to be related to the deglacial environment. Eskers deposited at altitudes higher than adjacent bodies of standing water are characterized by: (1) very abrupt topography with numerous sharp kettles; and (2) evidence of stream activity on and/or adjacent to the esker ridge. Such evidence includes trains of outwash sand and gravel flanking and partially burying the esker, abandoned stream channels incised into and across esker segments, stream-eroded till bluffs bordering the entire glaciofluvial complex, and deep meltwater channels in nearby bedrock. Broad, flat crests of esker ridges, elongate marginal kettles, and the occurrence of outwash and stream-cut till features downcurrent from present water divides are further accepted as indications that at least the latest phases of esker formation were subaerial. Eskers that formed where either glacial lakes or the sea abutted the ice-front are characterized by: (1) a lack of associated features related to stream activity; (2) occasional broadening and fining into esker-delta facies; and (3) beaches, bars, or boulder lags that resulted from washing. This latter characteristic is most pronounced where the sea, rather than a glacial lake, was involved because modification of the esker was continued longer by a larger water body, and because the drop in relative sea level was gradual rather than abrupt. As a result of this washing, the topography of eskers formed below sea level is commonly greatly subdued, with no kettles evident and with extensive beach and boulder-lag development. The peculiar 'beaded' eskers of southeastern District of Keewatin may owe their topographic expression to this subsequent washing rather than to primary episodic deposition.

Two sizes of pebbles, 1/4-1/2 inch and 1/2-1 inch, were sampled at regular intervals on the crests of some esker segments to study characteristics of sediment transport. Early results indicate an abnormally high energy environment at the confluence of two esker streams, resulting in the abrupt decrease in abundance of less resistant rock types. Also, a high rate of attrition in esker streams may be the cause of a higher proportion of resistant clasts in esker sediments than in the adjacent till.

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[1]Fyles, J.G.: Eskers west of Hudson Bay in Districts of Keewatin and Mackenzie; in Report of Activities, May to October 1966, Geol. Surv. Can., Paper 67-1A, p. 25 (1967).